






# W 24 Exi: Safe and reliable switching in Ex-areas

	<b>Photoelectric proximity switches, BGS</b>
	<b>Photoelectric reflex switches</b>
	<b>Through-beam photoelectric switches</b>



	<b>Photoelectric switches with fibre-optic cable</b>
<b>Proximity mode</b>	
	<b>Photoelectric switches with fibre-optic cable</b>
<b>Through-beam mode</b>	

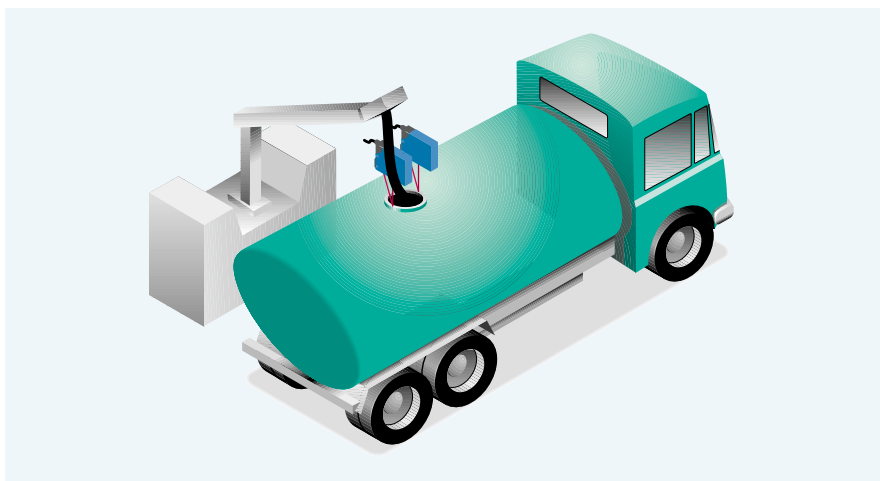
The device variants used depend on the specific application:

- the WT 24 Exi photoelectric proximity switch with an adjustable scanning distance of 300 to 2,000 mm and background suppression,
- the WL 24 Exi photoelectric reflex switch which reliably detects objects located up to 8 metres away,
- the WS/WE 24 Exi through-beam photoelectric switch with a scanning range of 30 metres, and
- the WLL 24 Exi fibre-optic cable version which, depending on the type of optical head, can be used in both through-beam and proximity mode whereby the maximum distance to the object is 100 mm and 35 mm respectively.

Intrinsic safety is an essential requirement for systems used in Ex-areas and is provided by the W 24 Exi series of photoelectric switches and photoelectric proximity switches. The control current at the switching output which varies according to the switching state complies with NAMUR, EN 50227; all devices are checked by the Federal Physical-Technical Office (PTB) in Brunswick, Germany, to ensure that they conform to the relevant safety standard and are classified as devices with protection type E Ex ia IIC T6. As a result, they may be used in potentially explosive zones 0 (except Germany – subject to VDE 0165), 1 and 2.

The sturdy zinc die-cast housings with enclosure rating IP 67 (IP 65 with WLL 24 Exi), the cable glands and plugs that can be rotated towards the bottom and rear of the sensor, and insensitivity to ambient light make all of these devices ideally suited for use in industrial environments.

► Ex-Zone 0:  
Robot arms used for filling tank trucks are finely positioned with WT 24 Exi photoelectric proximity switches.

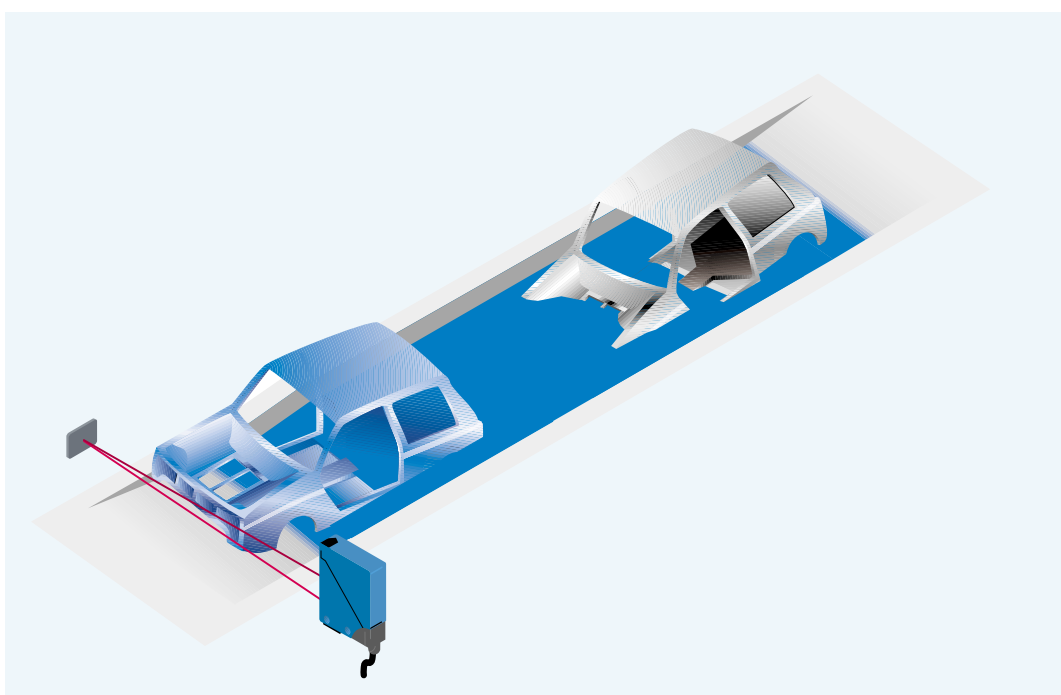


▼ Ex-Zone 1:  
Automatic palletisation/depalletisation of gas cylinders.



▲ Ex-Zone 0:  
Fully automatic revolving filling system for gas cylinders.

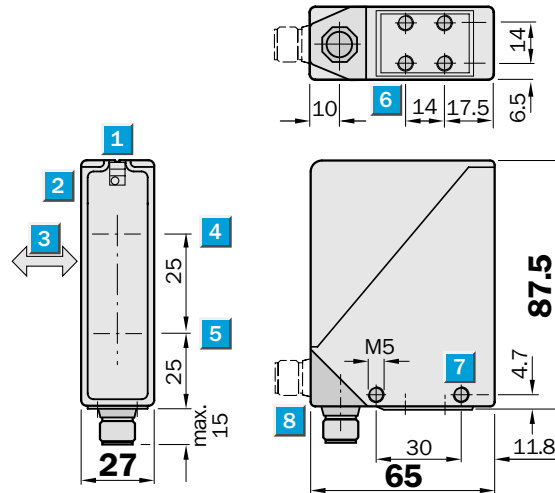
► Ex-Zone 1:  
Body panel detection with photoelectric reflex switches during fully automatic pretreatment of body shells.



	<b>Scanning distance</b> 150...600 mm
	<b>Scanning distance</b> 300...2000 mm
<b>Photoelectric reflex switches</b>	

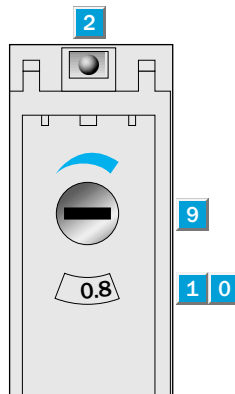
- Infrared light
- Adjustable background suppression
- Explosion protection EEx ia IIC T6
- Plug rotatable by 90°
- Terminal chamber

**Dimensional drawing**



**Adjustments possible**

WT 24-X 2101
WT 24-X 4101
WT 24-X 4601

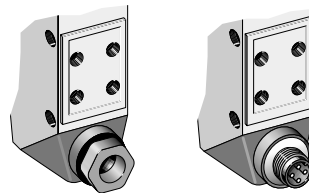


- 1 Alignment sight
- 2 LED signal strength indicator
- 3 Standard direction of the material being scanned
- 4 Centre of transmitter's optical axis
- 5 Centre of receiver's optical axis
- 6 M5 threaded mounting hole – 8 mm deep
- 7 M5 threaded mounting hole
- 8 PG 9 cable gland or M 12 plug, rotatable
- 9 Scanning distance adjustment
- 10 Scanning distance indicator

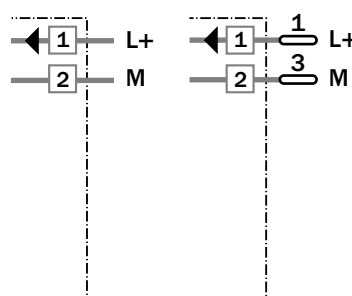


**Connection types**

WT 24-X 2101	WT 24-X 4101
	WT 24-X 4601



PG 9, terminals	4-pin, M 12
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<b>Accessories</b>	page
Cable receptacles	496
Mounting brackets	510
Power supply units	564



Technical data		WT 24-	X 2101	X 4101	X 4601
<b>Scanning distance</b>	300...2000 mm, adjustable				
	150...600 mm, adjustable				
<b>Light source<sup>1)</sup>, light type</b>	LED, infrared light				
<b>Supply voltage V<sub>S</sub><sup>2)</sup></b>	8.2 V DC (5...13.5 V) <sup>3)</sup>				
Ripple <sup>4)</sup>	0.4 V <sub>SS</sub>				
<b>Terminal capacitance</b>	≤ 15 nF				
<b>Terminal inductance</b>	≤ 75 μH				
<b>Current consumption<sup>5)</sup></b>					
Light beam unbroken	≥ 2.2 mA				
Light beam broken	≤ 1 mA				
<b>Switching output</b>	Control current dependent on switching state (to NAMUR EN 50227)				
<b>Switching mode</b>	Light-switching				
Response time <sup>6)</sup>	≤ 10 ms				
Max. switching frequency <sup>7)</sup>	50/s				
<b>Connection types</b>	Plug				
	Terminal connection				
<b>Approval</b>	PTB No. Ex97 D2034				
<b>VDE protection class<sup>8)</sup></b>	□				
<b>Circuit protection<sup>9)</sup></b>	A, C				
<b>Enclosure rating</b>	IP 65				
<b>Ambient temperature T<sub>A</sub></b>	Operation - 20 °C...+ 50 °C				
	Storage - 25 °C...+ 70 °C				
<b>Weight</b>	Approx. 330 g				
<b>Housing material</b>	Zinc die-cast housing				

1) Average service life 100,000 h at T<sub>A</sub> = + 25 °C

2) Supply with disconnecter device EN 2 Ex

3) Limit values

4) May not exceed or fall short of V<sub>S</sub> tolerances

5) Without load

6) Signal transit time with resistive load

7) With light/dark ratio 1:1

8) Reference voltage 50 V DC


9) A = V<sub>S</sub> connections reverse-polarity protected

C = Interference pulse suppression

Scanning distance		Order information	
<b>1</b>	<b>A</b>	200	800
<b>1</b>	<b>B</b>	150	300
<b>2</b>	<b>A</b>	200	1500
<b>2</b>	<b>B</b>	150	450
<b>3</b>	<b>A</b>	200	2000
<b>3</b>	<b>B</b>	150	600

Type	Part No.
WT 24-X 2101	1 011 974
WT 24-X 4101	1 011 973
WT 24-X 4601	1 013 120

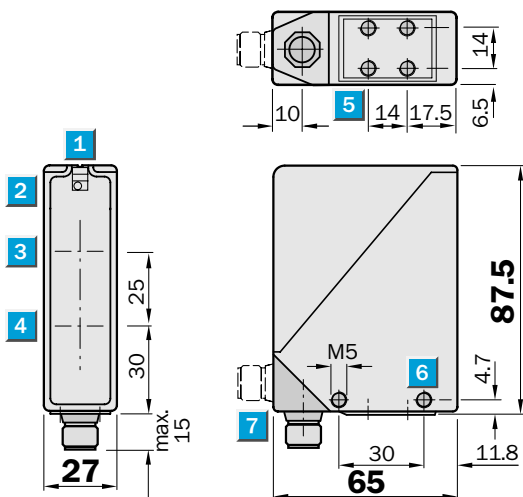
<b>1</b>	Scanning distance on black, 6 % remission
<b>2</b>	Scanning distance on grey, 18 % remission
<b>3</b>	Scanning distance on white, 90 % remission
<b>A</b>	WT 24-X 2101/X 4101
<b>B</b>	WT 24-X 4601


**Scanning range**  
**15 m**

Photoelectric reflex switches

- Red light
- Explosion protection EEx ia IIC T6
- Plug rotatable by 90°
- Terminal chamber

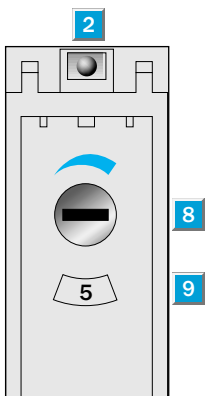
**Dimensional drawing**



**Adjustments possible**

WL 24-X 2301

WL 24-X 4301

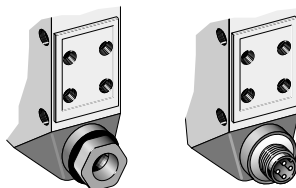


- 1 Alignment sight
- 2 LED signal strength indicator
- 3 Centre of receiver's optical axis
- 4 Centre of transmitter's optical axis
- 5 M5 threaded mounting hole – 8 mm deep
- 6 M5 threaded mounting hole
- 7 Cable gland, M 12 plug, rotatable
- 8 Sensitivity adjustment
- 9 Sensitivity indicator

**Connection types**

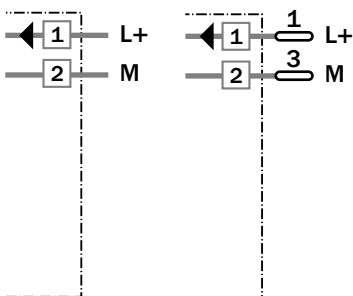
WL 24-X 2301

WL 24-X 4301



PG 9, terminals

4-pin, M 12



Accessories	page
Cable receptacles	496
Mounting brackets	510
Reflectors	520
Power supply units	564

<b>Technical data</b>		WL 24-	X 2301	X 4301										
<b>Scanning range</b> , max. typ./on reflector	15 m/PL 80 A													
Sensitivity	Adjustable													
<b>Light source<sup>1)</sup>, light type</b>	LED, red light													
Light spot diameter	Approx. 145 mm at 8 m													
<b>Supply voltage <math>V_S</math><sup>2)</sup></b>	8.2 V DC (5...13.5 V) <sup>3)</sup>													
Ripple <sup>4)</sup>	0.4 $V_{SS}$													
<b>Terminal capacitance</b>	≤ 15 nF													
<b>Terminal inductance</b>	≤ 75 μH													
Current consumption <sup>5)</sup>														
light beam unbroken	≥ 2.2 mA													
light beam broken	≤ 1 mA													
<b>Switching output</b>	Control current dependent on switching state (to NAMUR EN 50227)													
<b>Switching mode</b>	Light-switching													
Response time <sup>6)</sup>	≤ 10 ms													
Max. switching frequency <sup>7)</sup>	50/s													
<b>Connection types</b>	Plug													
	Terminal connection													
<b>Approval</b>	PTB No. Ex97 D2033													
<b>VDE protection class<sup>8)</sup></b>	□													
<b>Circuit protection<sup>9)</sup></b>	A, C													
<b>Enclosure rating</b>	IP 67													
<b>Ambient temperature <math>T_A</math></b>	Operation - 20 °C...+ 50 °C Storage - 25 °C...+ 70 °C													
<b>Weight</b>	Approx. 330 g													
<b>Housing material</b>	Zinc die-cast housing													

1) Average service life 100,000 h at  $T_A = + 25 °C$

2) Supply with disconnecter device EN 2 Ex

3) Limit values

4) May not exceed or fall short of  $V_S$  tolerances

5) Without load

6) Signal transit time with resistive load

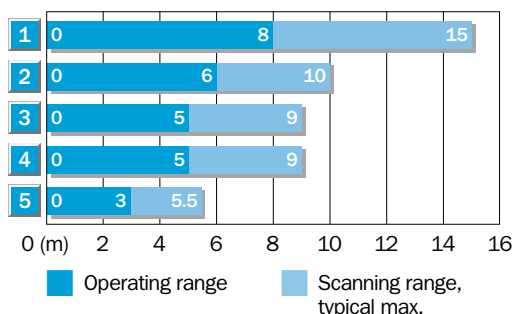
7) With light/dark ratio 1:1

8) Reference voltage 50 V DC

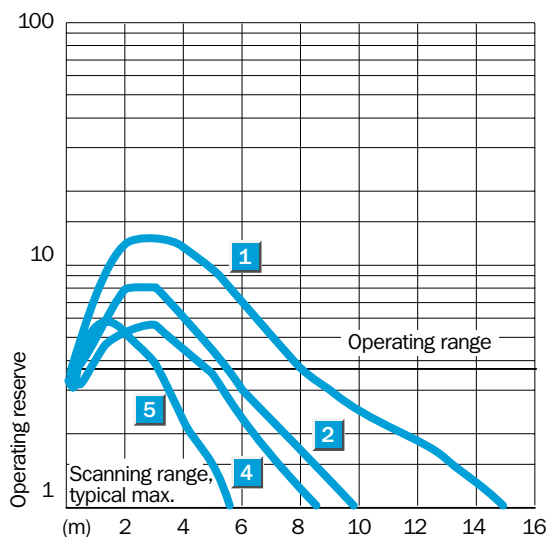
9) A =  $V_S$  connections reverse-polarity protected

C = Interference pulse suppression

**Scanning range and operating reserve**



Reflector type	Operating range
1 PL 80 A	0...8.0 m
2 PL 50 A	0...6.0 m
3 PL 40 A	0...5.0 m
4 PL 30 A	0...5.0 m
5 PL 20 A	0...3.0 m



**Order information**

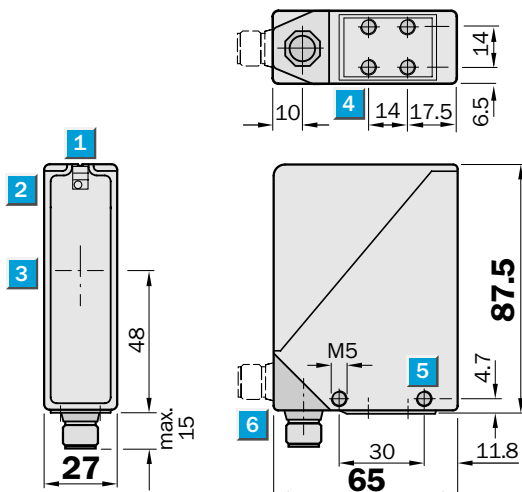
Type	Part No.
WL 24-X 2301	1 011 972
WL 24-X 4301	1 011 971

**Scanning range**  
40 m

Through-beam photoelectric switches

- Red light
- Explosion protection EEx ia IIC T6
- Plug rotatable by 90°
- Terminal chamber

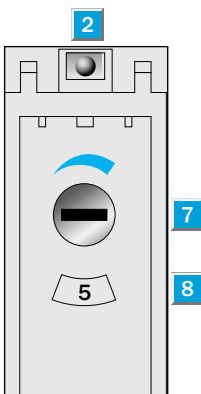
**Dimensional drawing**



**Adjustments possible**

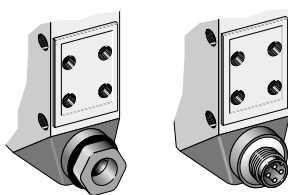
WS/WE 24-X 2301  
WS/WE 24-X 4301

- 1** Alignment sight
- 2** LED signal strength indicator on WE  
Power indicator on WS
- 3** Centre of optical axis
- 4** M5 threaded mounting hole – 8 mm deep
- 5** M5 threaded mounting hole
- 6** Cable gland, M 12 plug, rotatable
- 7** Sensitivity adjustment
- 8** Sensitivity indicator

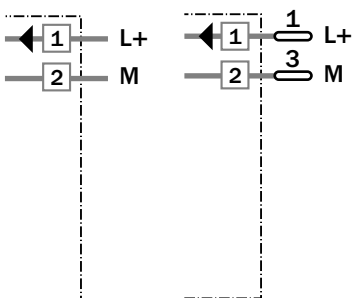


**Connection types**

WS/WE 24-X 2301 | WS/WE 24-X 4301



PG 9, terminals | 4-pin, M 12



Accessories	page
Cable receptacles	496
Mounting brackets	510
Power supply units	564

Technical data		WS/WE 24-	X 2301	X 4301									
<b>Scanning range</b> , max. typical	0...40 m												
Sensitivity	Adjustable												
<b>Light source</b> <sup>1)</sup> , <b>light type</b>	LED, red light												
Light spot diameter	Approx. 450 mm at 25 m												
<b>Supply voltage</b> $V_S$ <sup>2)</sup>	8.2 V DC (5...13.5 V) <sup>3)</sup>												
Ripple <sup>4)</sup>	0.4 $V_{SS}$												
<b>Terminal capacitance</b>	≤ 15 nF												
<b>Terminal inductance</b>	≤ 150 μH												
Current consumption <sup>5)</sup>													
Sender permanent	≥ 2.2 mA												
Receiver with light beam unbroken	≥ 2.2 mA												
Receiver with light beam broken	≤ 1 mA												
<b>Switching output</b>	Control current dependent on switching state (to NAMUR EN 50227)												
<b>Switching mode</b>	Light-switching												
Response time <sup>6)</sup>	≤ 10 ms												
Max. switching frequency <sup>7)</sup>	50/s												
<b>Connection types</b>	Plug												
	Terminal connection												
<b>Approval</b>	PTB No. Ex97 D2035												
<b>VDE protection class</b> <sup>8)</sup>	□												
<b>Circuit protection</b> <sup>9)</sup>	A, C												
<b>Enclosure rating</b>	IP 67												
<b>Ambient temperature</b> $T_A$	Operation - 20 °C...+ 40 °C												
	Storage - 25 °C...+ 70 °C												
<b>Weight</b>	Approx. 330 g												
<b>Housing material</b>	Zinc die-cast housing												

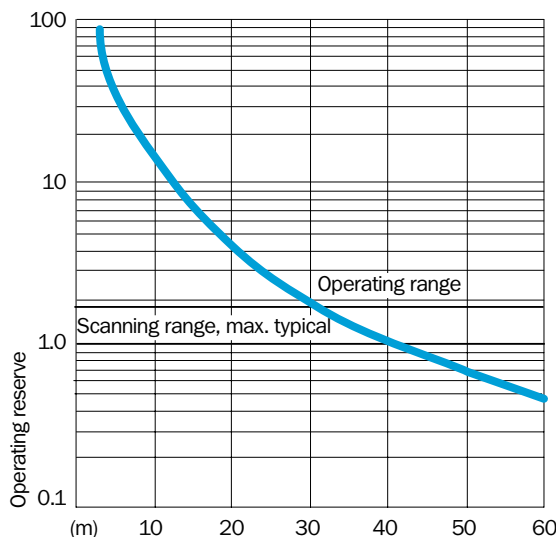
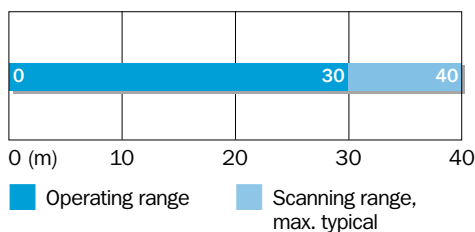
1) Average service life 100,000 h at  $T_A = + 25 °C$   
 2) Supply with disconnecter device EN 2 Ex

3) Limit values  
 4) May not exceed or fall short of  $V_S$  tolerances

5) Without load  
 6) Signal transit time with resistive load  
 7) With light/dark ratio 1:1

8) Reference voltage 50 V DC  
 9) A =  $V_S$  connections reverse-polarity protected  
 C = Interference pulse suppression



**Scanning range and operating reserve**



**Order information**

Type	Part No.
WS/WE 24-X 2301	1 011 516
WS/WE 24-X 4301	1 011 517

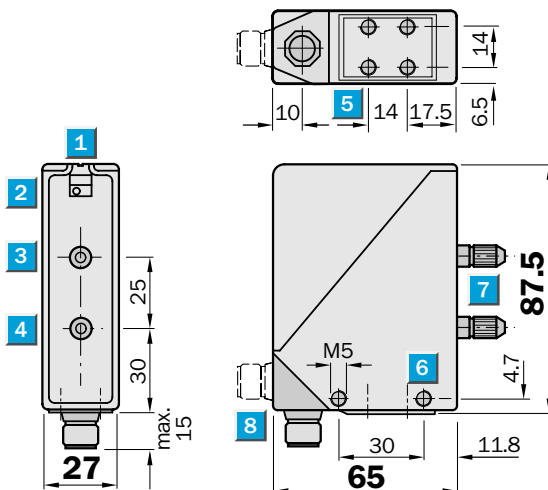


	<b>Scanning range</b> ...100 mm (max. 1000 mm)
<b>Through-beam system</b>	
	<b>Scanning distance</b> ...35 mm
<b>Proximity system</b>	

- Red light
- Interchangeable fibre-optic cable
- Explosion protection EEx ia IIC T6
- Plug rotatable by 90°
- Terminal chamber

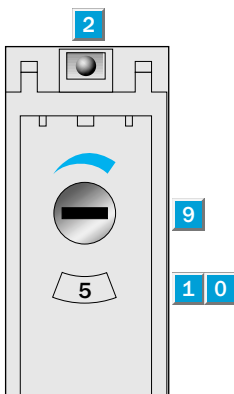


**Dimensional drawing**



**Adjustments possible**

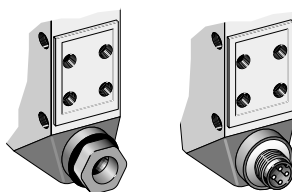
- WLL 24-X 2301
- WLL 24-X 4301



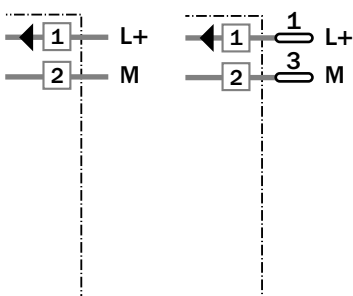
- 1 Alignment sight
- 2 LED signal strength indicator
- 3 Centre of receiver's optical axis
- 4 Centre of transmitter's optical axis
- 5 M5 threaded mounting hole – 8 mm deep
- 6 M5 threaded mounting hole
- 7 Connector for fibre-optic cable
- 8 PG 9 cable gland or M 12 plug, rotatable
- 9 Sensitivity adjustment
- 10 Sensitivity indicator

**Connection types**

- WLL 24-X 2301
- WLL 24-X 4301



- PG 9, terminals
- 4-pin, M 12



Accessories	page
Cable receptacles	496
Mounting brackets	510
Fibre-optic cables	528
Power supply units	564

Technical data		WLL 24-	X 2301	X 4301								
<b>Scanning range</b> , through-beam system	100 mm with LL 3 – TB 02											
	1000 mm with tip adapter LL 3 – TA 01											
<b>Scanning distance</b> , proximity system	35 mm with LL 3 – DB 01											
Fibre-optic cable	See Accessories, p. 528 onwards											
Sensitivity	Adjustable											
<b>Light source<sup>1)</sup>, light type</b>	LED, red light											
<b>Supply voltage <math>V_S</math><sup>2)</sup></b>	8.2 V DC (5...13.5 V) <sup>3)</sup>											
Ripple <sup>4)</sup>	0.4 $V_{SS}$											
<b>Terminal capacitance</b>	≤ 15 nF											
<b>Terminal inductance</b>	≤ 75 μH											
Current consumption <sup>5)</sup>												
light beam unbroken	≥ 2.2 mA											
light beam broken	≤ 1 mA											
<b>Switching output</b>	Control current dependent on switching state (to NAMUR EN 50227)											
<b>Switching mode</b>	Light-switching											
Response time <sup>6)</sup>	≤ 10 ms											
Max. switching frequency <sup>7)</sup>	50/s											
<b>Connection types</b>	Plug											
	Terminal connection											
<b>Approval</b>	PTB Nr. Ex97 D2036											
<b>VDE protection class<sup>8)</sup></b>	□											
<b>Circuit protection<sup>9)</sup></b>	A, C											
<b>Enclosure rating</b>	IP 65											
<b>Ambient temperature <math>T_A</math></b>	Operation – 20 °C...+ 50 °C											
	Storage – 25 °C...+ 70 °C											
<b>Weight</b>	Approx. 330 g											
<b>Housing material</b>	Zinc die-cast housing											

1) Average service life 100,000 h at  $T_A = + 25 °C$

2) Supply with disconnecter device EN 2 Ex

3) Limit values

4) May not exceed or fall short of  $V_S$  tolerances

5) Without load

6) Signal transit time with resistive load

7) With light/dark ratio 1:1

8) Reference voltage 50 V DC

9) A =  $V_S$  connections reverse-polarity protected

C = Interference pulse suppression

#### Order information

Type	Part No.
WLL 24-X 2301	1 011 562
WLL 24-X 4301	1 012 711